

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Linthicum, Kevin J.

Serial Number: Unassigned

Filed: Concurrently Herewith

Related Application Info:
Ser. No. 09/850,687
Filed: May 7, 2001

For: PENDEOEPITAXIAL METHODS OF FABRICATING GALLIUM NITRIDE SEMICONDUCTOR LAYERS ON SILICON WAFERS OR WAFERS CONTAINING SILICON, AND GALLIUM NITRIDE SEMICONDUCTOR STRUCTURES FABRICATED THEREBY

Commissioner for Patents
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**INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. § 1.56 AND 37 C.F.R. § 1.97**

It is respectfully requested that the document(s) listed on the attached Form PTO/1449 be considered by the Patent and Trademark Office in the above-referenced application and made of record therein. All items listed on the PTO/1449 were cited in parent application Serial No. 09/850,687, filed November 24, 1998. Since the benefit of this application is claimed under 35 U.S.C. §120, no copies need to be furnished in accordance with 37 C.F.R. §1.98(d); however, copies will be furnished on request.

Respectfully submitted,

By:

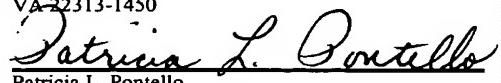

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August 4, 2003

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Patricia L. Pontello

Form PTO-1449		U.S. Department of Commerce Patent and Trademark Office		Attorney Docket No. 5051-448CT		Serial No.: To Be Assigned	
				Applicants: Kevin J. Linthicum, et al.			
		LIST OF DOCUMENTS CITED BY APPLICANT (Use several sheets if necessary)		Filing Date: Concurrently Herewith		GAU:	

U.S. PATENT DOCUMENTS

Examiner Initials		Document No.	Date	Name	Class	Subclass	Filing Date if Appropriate
	1	Re. 34,861	02/14/95	Davis et al.	437	100	
	2	6,153,010	11/28/00	Koyoku et al.	117	95	
	3	6,100,111	08/08/00	Konstantinov	438	92	
	4	6,100,104	08/08/00	Haerle	438	33	
	5	6,051,849	04/08/00	Davis	257	103	
	6	6,051,849	04/08/00	Davis	257	103	
	7	5,915,194	06/22/99	Powell et al.	438	478	
	8	5,912,477	06/15/99	Negley	257	95	
	9	5,880,485	03/09/99	Marx et al.	257	94	
	10	5,877,070	03/02/99	Goesele et al.	438	458	
	11	5,815,520	09/29/98	Furushima	372	45	
	12	5,786,606	07/28/98	Nishio et al.	257	103	
	13	5,786,606	07/28/98	Nishio et al.	257	103	
	14	5,760,426	06/02/98	Marx et al.	257	190	
	15	5,710,057	01/20/98	Kenney	437	62	
	16	5,549,747	08/27/96	Bozler et al.	117	43	
	17	5,397,736	03/14/95	Bauser et al.	437	92	
	18	5,389,571	02/14/95	Takeuchi et al.	437	133	
	19	5,156,995	10/20/92	Fitzgerald, Jr. et al.	437	90	
	20	5,122,845	06/16/92	Manabe et al.	357	17	
	21	4,946,547	08/09/90	Palmour et al.	156	643	
	22	4,946,547	08/09/90	Palmour et al.	156	643	
	23	4,912,064	03/27/90	Kong et al.	437	100	
	24	4,912,064	03/27/90	Kong et al.	437	100	
	25	4,876,210	10/24/89	Barnett et al.	437	5	
	26	4,865,685	09/12/89	Palmour	156	643	
	27	4,865,685	09/12/89	Palmour	156	643	
	28	4,651,407	03/24/87	Bencuya	29	571	
	29	4,522,661	06/11/85	Morrison et al.	148	33.2	
	30	4,127,792	11/28/78	Nakata	313	500	
	31	09/441,753		Gehrke et al.			11/17/99
	32	09/327,136		Zheleva et al.			06/07/99
	33	09/198,784		Linthicum et al.			11/24/98
	34	09/031,843		Davis et al.			02/27/98

FOREIGN PATENT DOCUMENTS

	Document Number	Date	Country	Class	Subclass	Translation Yes / No
	35 EP 0 951 055 A2	10/20/99	EPO			
	36 EP 0 942 459 A1	09/15/99	EPO			
	37 11-145516	05/28/99	Japan			X (Abstract)
	38 WO 98/47170	10/22/98	PCT			
	39 2,258,080	10/22/98	Canada			X
	40 EP 0 852 416 A1	07/08/98	EPO			
	41 JP 9-324997	11/26/97	Japan			X
	42 JP 9-290098	10/22/97	Japan			X
	43 JP 9-277448	10/09/97	Japan			X
	44 JP 9-201477	07/28/97	Japan			X
	45 JP 9-181071	07/07/97	Japan			X
	46 JP 9-174494	06/30/97	Japan			X
	47 JP 9-93315	04/11/97	Japan			X
	48 WO 97/11518	03/27/97	PCT			X (Abstract)
	49 JP 8-153931	06/11/96	Japan			X (Abstract)
	50 JP 8-125251	05/17/96	Japan			X (Abstract)

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Date Considered:

Examiner:

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	51	JP 8-116093	05/07/96	Japan		X (Abstract)
	52	08-064791	03/08/96	Japan		X (Abstract)
	53	JP 8-18159	01/19/96	Japan		X (Abstract)
	54	0 551 721 A2	07/21/93	EPO		
	55	JP 5-41536	02/19/93	Japan		X (Abstract)
	56	JP 5-7016	01/14/93	Japan		X (Abstract)
	57	JP 4-188678	07/07/92	Japan		X (Abstract)
	58	JP 3-132016	06/05/91	Japan		X (Abstract)

OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)

	59	International Search Report, PCT/US99/04346, June 9, 1999				
	60	International Search Report, PCT/US99/28056, April 26, 2000				
	61	International Search Report, PCT/US99/27358, April 28, 2000				
	62	International Search Report, PCT/US99/12967, October 18, 1999				
	63	Honda et al., <i>Selective Area Growth of GaN Microstructures on Patterned (111) and (001) Si Substrates</i> , 4 th European Workshop on GaN, Nottingham, UK, July 2-5, 2000				
	64	Gehrke et al., <i>Pendo-Epitaxial Growth of Gallium Nitride on Silicon Substrates</i> , Journal of Electronic Materials, Vol. 29, No. 3, March 2000, pp. 306-310				
	65	Leo Unmasked by Pendo-Epitaxy, Compound Semiconductor, March 1999, p 16				
	66	Gehrke et al., <i>Pendo-Epitaxy of Gallium Nitride and Aluminum Nitride Films and Heterostructures on Silicon Carbide Substrate</i> , MRS Internet J. Semicond. Res. 4S1, G3.2, 1999, 6 pp.				
	67	Thomson et al., <i>Ranges of Deposition Temperatures Applicable for Metalorganic Vapor Phase Epitaxy of GaN Films Via the Technique of Pendo-Epitaxy</i> , MRS Internet J. Semicond. Res. 4S1, G3.37, 1999, 6 pp.				
	68	<i>Gallium Nitride-2000-Technology, Status, Applications, and Market Forecasts</i> , Strategies Unlimited, Report SC-23, May 2000				
	69	Chen et al., <i>Dislocation Reducing in GaN Thin Films Via Lateral Overgrowth From Trenches</i> , Applied Physics Letters, Vol. 75, No. 14, October 4, 1999, pp. 2062-2063				
	70	Nakamura, <i>InGaN/GaN/AlGaN-Based Laser Diodes</i> , Properties, Processing and Applications of Gallium Nitride and Related Semiconductors, EMIS Databeviews Series No. 23, 1998, pp. 587-595				
	71	Hiramatsu et al., <i>Selective Area Growth and Epitaxial Lateral Overgrowth of GaN</i> , Properties, Processing and Applications of Gallium Nitride and Related Semiconductors, EMIS Databeviews Series No. 23, 1998, pp. 440-446				
	72	Sakai, <i>Defect Structure in Selectively Grown GaN Films With Low Threading Dislocation Density</i> , Appl. Phys. Lett., Vol. 71, No. 16, October 20, 1997, pp. 2259-2261				
	73	Gustafsson et al., <i>Investigations of High Quality Ge_xSi_{1-x} Grown by Heteroepitaxial Lateral Overgrowth Using Cathodoluminescence</i> , Inst. Phys. Conf. Ser. No. 134: Section 11, Micros. Semicond. Mater. Conf., Oxford, April 5-8, 1993, pp. 675-678				
	74	Givargizov, <i>Other Approaches to Oriented Crystallization on Amorphous Substrates</i> , Chapter 4, Oriented Crystallization on Amorphous Substrates, Plenum Press, 1991, pp. 221-264				
	75	Akasaki et al., <i>Effects of AlN Buffer Layer on Crystallographic Structure and on Electrical and Optical Properties of GaN and Ga_{1-x}Al_xN (0 < x < 0.4) Films Grown on Sapphire Substrate by MOVPE</i> , Journal of Crystal Growth, Vol. 98, 1989, pp. 209-219				
	76	Ujiie et al., <i>Epitaxial Lateral Overgrowth of GaAs on a Si Substrate</i> , Jpn. J. Appl. Phys., Vol. 28, 1989, p. L337-L339				
	77	Ishiwara et al., <i>Lateral Solid Phase Epitaxy of Amorphous Si Films on Si Substrates With SiO₂ Patterns</i> , Applied Physics Letters, Vol. 43, No. 11, December 1, 1983, pp. 1028-1030				
	78	Jastrzebski, <i>SOI by CVD: Epitaxial Lateral Overgrowth (ELO) Process-Review</i> , Journal of Crystal Growth, Vol. 63, 1983, pp. 493-526				
	79	Rathman et al., <i>Lateral Epitaxial Overgrowth of Silicon on SiO₂</i> , Journal of the Electrochemical Society, October 1982, pp. 2303-2306				
	80	Shaw, <i>Selective Epitaxial Deposition of Gallium Arsenide in Holes</i> , Journal of the Electrochemical Society, September 1966, pp. 904-908				
	81	Tausch, Jr. et al., <i>A Novel Crystal Growth Phenomenon: Single Crystal GaAs Overgrowth Onto Silicon Dioxide</i> , Journal of the Electrochemical Society, July 1965, pp. 706-709				
	82	Joyce et al., <i>Selective Epitaxial Deposition of Silicon</i> , Nature, Vol. 4840, August 4, 1962, pp. 485-486				
	83	Linthicum et al., <i>Pendoepitaxy of Gallium Nitride Thin Films</i> , Applied Physics Letters, Vol. 75, No. 2, July 12, 1999, pp. 196-198				
	84	Nakamura, <i>InGaN-Based Violet Laser Diodes</i> , Semicond. Sci. Technol., 14, 1999, pp. R27-R40				
	85	Nakamura et al., <i>Violet InGaN/GaN/AlGaN-Based Laser Diodes Operable at 50°C With a Fundamental Transverse Mode</i> , Jpn. J. Appl. Phys. Vol 38, Part 1, No. 3A, March 1, 1999, pp. L226-L229				
	86	Zheleva et al., <i>Pendo-Epitaxy: A New Approach for Lateral Growth of Gallium Nitride Films</i> , Journal of Electronic Materials, Vol. 28, No. 4, February 1999, pp. L5-L8				

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Date Considered:

Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

	87	Boo et al., <i>Growth of Hexagonal GaN Thin Films on Si(111) with Cubic SiC Buffer Layers</i> , Journal of Crystal Growth 189-190, 1998, pp. 183-188
	88	Zheleva et al., <i>Pendo-Epitaxy-A New Approach for Lateral Growth of GaN Structures</i> , MRS Internet Journal of Nitride Semiconductor Research, 1999, Online!, Vol. 4S1, No. G3.38, November 30, 1998-December 4, 1998
	89	Linthicum et al., <i>Process Routes for Low-Defect Density GaN on Various Substrates Employing Pendo-Epitaxial Growth Techniques</i> , MRS Internet Journal of Nitride Semiconductor Research, Fall Meeting of the Materials Research Society, Vol. 4S1, No. G4.9, November 30, 1998-December 4, 1998
	90	Nakamura et al., <i>InGaN/GaN/AlGaN-Based Laser Diodes Grown on GaN Substrates With a Fundamental Transverse Mode</i> , Jpn. J. Appl. Phys., Vol. 37, September 15, 1998, pp. L1020-L1022
	91	Marchand et al., <i>Microstructure of GaN Laterally Overgrown by Metalorganic Chemical Vapor Deposition</i> , Applied Physics Letters, Vol. 73, No. 6, August 10, 1998, pp. 747-749
	92	Sakai et al., <i>Transmission Electron Microscopy of Defects in GaN Films Formed by Epitaxial Lateral Overgrowth</i> , Vol. 73, No. 4, July 27, 1998, pp. 481-483
	93	Nakamura et al., <i>High-Power, Long-Lifetime InGaN/GaN/AlGaN-Based Laser Diodes Grown on Pure GaN Substrates</i> , Jpn. J. Appl. Phys., Vol. 37, March 15, 1998, pp. L309-L312
	94	Nam et al., <i>Lateral Epitaxial Overgrowth of GaN Films on SiO₂ Areas Via Metalorganic Vapor Phase Epitaxy</i> , Journal of Electronic Materials, Vol. 27, No. 4, 1998, pp. 233-237
	95	Wu et al., <i>Growth and Characterization of SiC Films on Large-Area Si Wafers by APCVD-Temperature Dependence</i> , Materials Science Forum, Vols. 264-268, 1998, pp. 179-182
	96	Nakamura et al., <i>InGaN/GaN/AlGaN-Based Laser Diodes With Modulation-Doped Strained-Layer Superlattices</i> , Jpn. J. Appl. Phys., Vol. 36, December 1, 1997, pp. L1568-L1571
	97	Kapolnek et al., "Anisotropic Epitaxial Lateral Growth in GaN Selective Area Epitaxy", Appl. Phys. Lett. 71 (9), 1 September 1997, pp. 1204-1206
	98	Usui et al., "Thick GaN Epitaxial Growth With Low Dislocation Density by Hydride Vapor Phase Epitaxy", Jpn. J. Appl. Phys., Vol. 36, Part 2, No. 7B, 15 July 1997, pp. 899-902
	99	Nam et al., <i>Lateral Epitaxy of Low Defect Density GaN Layers Via Organometallic Vapor Phase Epitaxy</i> , Appl. Phys. Lett., Vol. 71, No. 18, November 3, 1997, pp. 2638-2640
	100	Zheleva et al., <i>Dislocation Density Reduction Via Lateral Epitaxy in Selectively Grown GaN Structures</i> , Appl. Phys. Lett., Vol. 71, No. 17, October 27, 1997, pp. 2472-2474
	101	Nam, et al., "Growth of GaN and Al _{0.2} Ga _{0.8} N on Patterned Substrates Via Organometallic Vapor Phase Epitaxy", Jpn. J. Appl. Phys., Vol. 36, Part 2, No. 5A, 1 May 1997, pp. 532-535
	102	Nam et al., "Selective Growth of GaN and Al _{0.2} Ga _{0.8} N on GaN/AlN/6H-SiC(0001) Multilayer Substrates Via Organometallic Vapor Phase Epitaxy", Proceedings MRS, December 1996, 6 pp.
	103	Steckl et al., <i>SiC Rapid Thermal Carbonization of the (111)Si Semiconductor-on-Insulator Structure and Subsequent Metalorganic Chemical Vapor Deposition</i> , Appl. Phys. Lett., 69 (15), October 7, 1996, pp. 2264-2266
	104	Kapolnek et al., "Selective Area Epitaxy of GaN for Electron Field Emission Devices", Journal of Crystal Growth, 5451, 1996, pp. 1-4
	105	Weeks et al., "GaN Thin Films Deposited Via Organometallic Vapor Phase Epitaxy on α (6H)-SiC(0001) Using High-Temperature Monocrystalline AlN Buffer Layers", Appl. Phys. Lett. 67 (3), 17 July 1995, pp. 401-403
	106	Doverspike et al., <i>The Effect of GaN and AlN Buffer Layers on GaN Film Properties Grown on Both C-Plane and A-Plane Sapphire</i> , Journal of Electronic Materials, Vol. 24, No. 4, 1995, pp. 269-273
	107	Kato et al., "Selective Growth of Wurtzite GaN and Al _x Ga _{1-x} N on GaN/Sapphire Substrates by Metalorganic Vapor Phase Epitaxy", Journal of Crystal Growth, 144, 1994, pp. 133-140
	108	Kuznia et al., <i>Influence of Buffer Layers on the Deposition of High Quality Single Crystal GaN Over Sapphire Substrates</i> , J. Appl. Phys., Vol. 73, No. 9, May 1, 1993, pp. 4700-4702
	109	Watanabe et al., <i>The Growth of Single Crystalline GaN on a Si Substrate Using AlN As An Intermediate Layer</i> , Journal of Crystal Growth, Vol. 128, 1993, pp. 391-396
	110	Yamaguchi et al., "Lateral Supply Mechanisms in Selective Metalorganic Chemical Vapor Deposition", Jpn. Appl. Phys., Vol. 32 (1993), pp. 1523-1527
	111	Nakamura, <i>GaN Growth Using GaN Buffer Layer</i> , Japanese Journal of Applied Physics, Vol. 30, No. 10A, October 1991, pp. L1705-L1707
	112	Chen et al., <i>Silicon-on-Insulator: Why, How, and When</i> , AIP Conference Proceedings, Vol. 167, No. 1, September 15, 1988, pp. 310-319
	113	Amano et al., <i>Metalorganic Vapor Phase Epitaxial Growth of a High Quality GaN Film Using an AlN Buffer Layer</i> , Applied Physics Letters, Vol. 48, No. 5, February 3, 1986, pp. 353-355
	114	Yoshida et al., <i>Improvements on the Electrical and Luminescent Properties of Reactive Molecular Beam Epitaxially Grown GaN Films by Using AlN-Coated Sapphire Substrates</i> , Applied Physics Letters, Vol. 42, No. 5, March 1, 1983, pp. 427-429

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